PREPARE TUTORIAL ENVIRONMENT

1. - CLONE PROJECT EXAMPLE

Clone the project in your PC.

You will need:

GIT installed.

Tortoise SVN (Optional) installed.

Run the following command in cmd:

"git clone https://github.com/kimy82/curso.git "

This command will create a folder called "curso".

2. - IMPORT PROJECT IN ECLIPSE

You will need:

JAVA (JDK) installed.
(http://www.oracle.com/technetwork/java/javase/downloads/jdk8/downloads-2133151.html)

Maven go to https://maven.apache.org/install.html for installing and go to http://archive.apache.org/dist/maven/binaries/ for downloading.

Eclipse installed. (I have chosen Eclipse mars).

http://www.eclipse.org/downloads/download.php?file=/technology/epp/downloads/release/mars/R/eclipse-jee-mars-R-win32-x86_64.zip

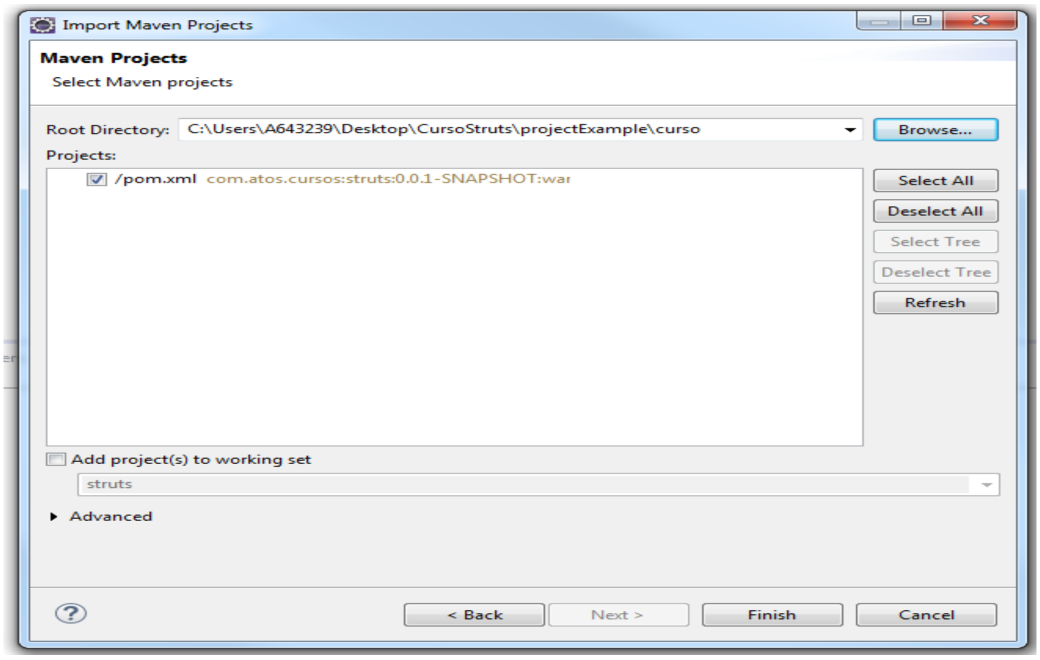
SVN (SVN Kit) Plugin installed. (**Subversive – SVN Team Provider 4.0.0** from the eclipse marketplace)

m2e (**Maven integration for Eclipse** from the eclipse marketplace)

Steps

1st Option

Import in Eclipse from cloned project as existing maven project.


Import Maven Projects

Maven Projects

Select Maven projects

Root Directory: C:\Users\A643239\Desktop\CursoStruts\projectExample\curso

Projects:

[✓] /pom.xml com.atos.cursos:struts:0.0.1-SNAPSHOT:war

[ ] Add project(s) to working set

struts

2nd Option

Checkout from SVN within Eclipse.

- Create a new repository location in Eclipse SVN. The repository URL is https://github.com/kimy82/curso.git.

- From the trunk folder right click and select "Check out" option.

- Once the checkout is done right click in the project and select configure -> convert to maven project.

3. - INSTALLED AND CONFIGURE TIMESTEN DB

Download times ten from: http://www.oracle.com/technetwork/database/database-technologies/timesten/downloads/index.html

Create the DSN
https://docs.oracle.com/cd/E11882_01/timesten.112/e21633/using.htm#TTOPR131

The Data Source Name must be the same as used in TtConnection Java class. (Kimtt)

Once created the DSN open cmd and type:

- *ttisql*

- *connect "dsn= kimtt";*

- Create the table and sequence that we need for the tutorial. The sql is in db.sql, within the project.

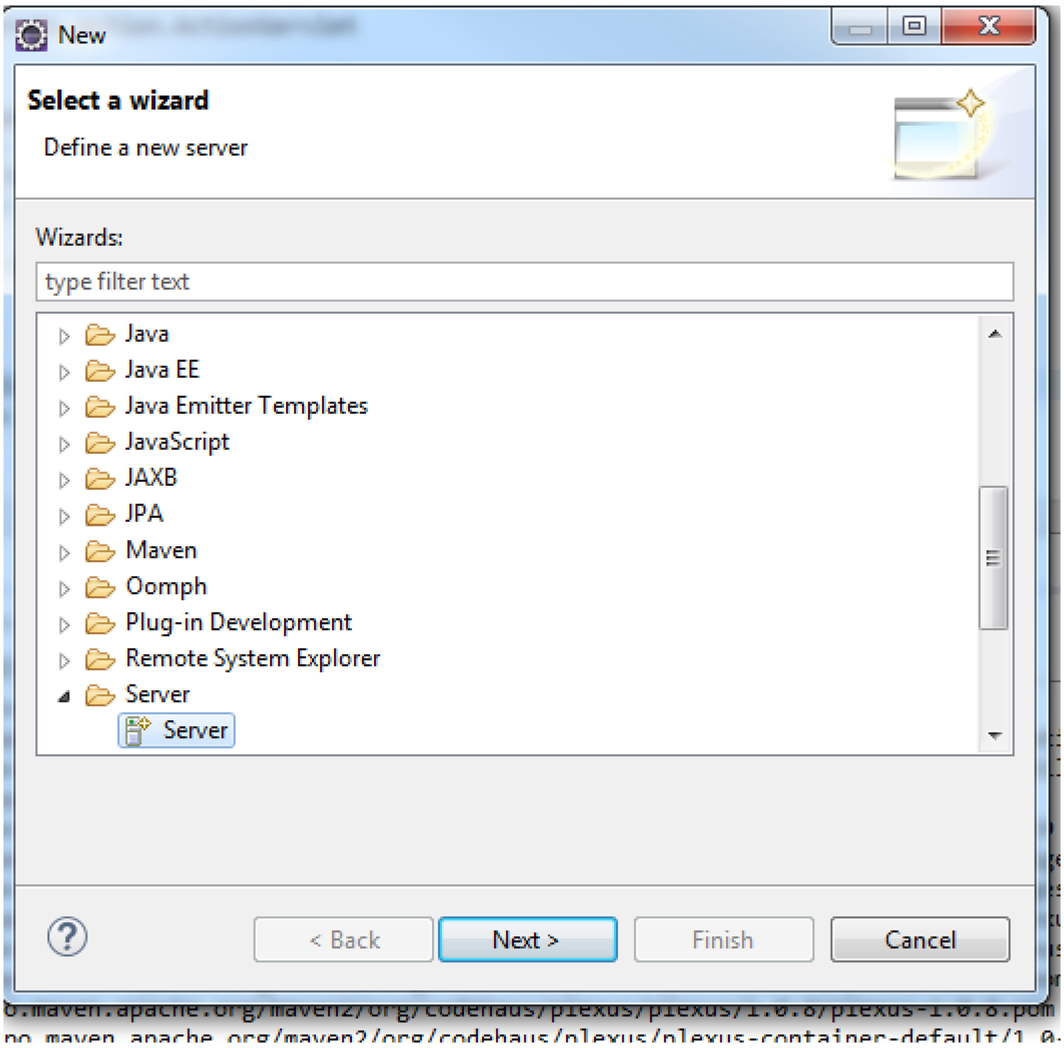
Now we should install the driver in maven repository in order to be able to use it later on. Ruin the following command from the *C:\TimesTen\tt1122_64\lib* folder.

```
mvn install:install-file -DgroupId=com.timesten -DartifactId=ttjdbc7 \ -
Dversion=1 -Dpackaging=jar -Dfile=ttjdbc7.jar -DgeneratePom=true
```

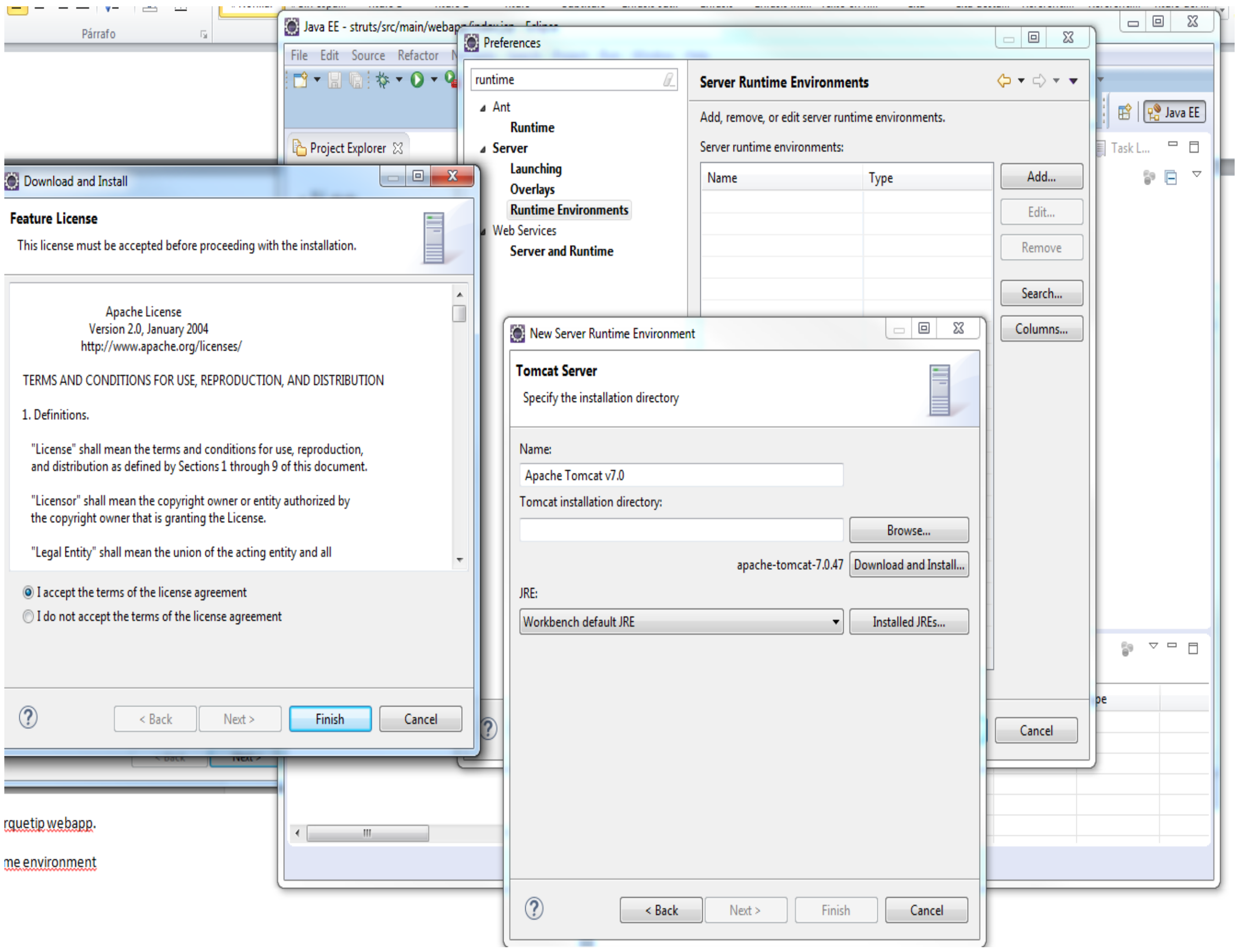
* TimesTen more info in:
http://download.oracle.com/otn_hosted_doc/timesten/701/TimesTen-Documentation/java_dev.pdf

4. - CREATE TOMCAT SERVER IN ECLIPSE

Right click in Servers tab in eclipse and select: new -> Server.



Select Tomcat 7 from the list. (Click auto install if you do not have it installed)



Download and Install

Feature License

This license must be accepted before proceeding with the installation.

Apache License
Version 2.0, January 2004
http://www.apache.org/licenses/

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all

[✓ I accept the terms of the license agreement]
I do not accept the terms of the license agreement

< Back | Next > | Finish | Cancel

Preferences

runtime

- Ant
  - Runtime
- Server
  - Launching
  - Overlays
  - Runtime Environments
- Web Services
  - Server and Runtime

Server Runtime Environments

Add, remove, or edit server runtime environments.

Server runtime environments:

Name	Type

Add... | Edit... | Remove | Search... | Columns...

Cancel

New Server Runtime Environment

Tomcat Server

Specify the installation directory

Name:
Apache Tomcat v7.0

Tomcat installation directory:

Browse...

apache-tomcat-7.0.47 Download and Install...

JRE:
Workbench default JRE

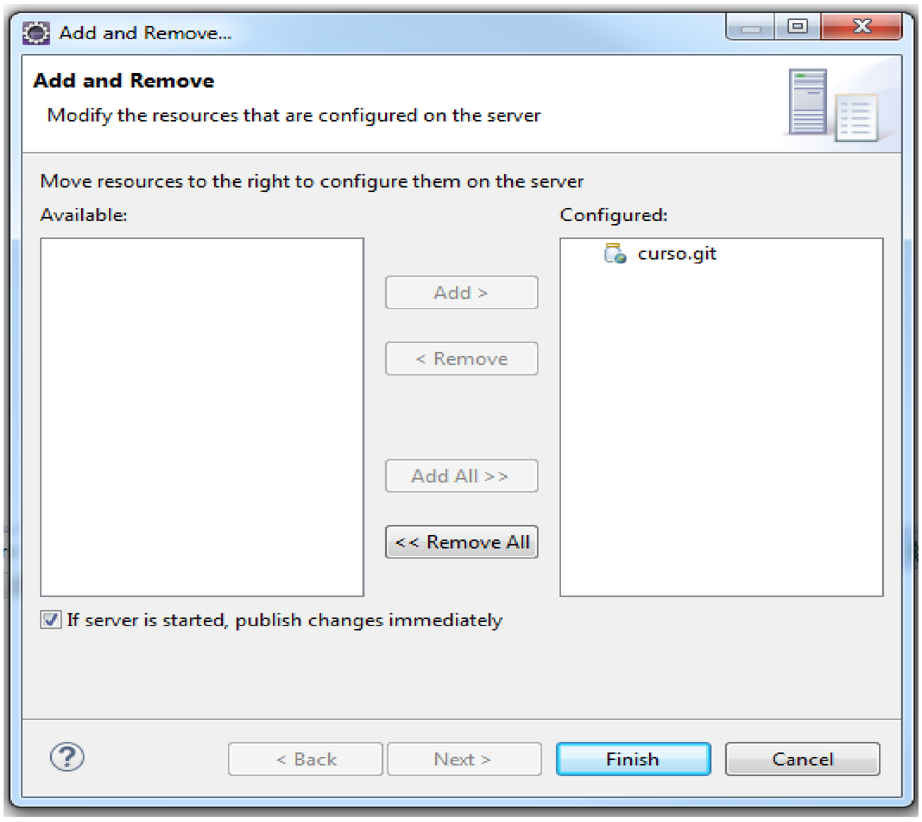
Installed JREs...

< Back | Next > | Finish | Cancel

rquetip webapp.

me environment

Add the project in the server.

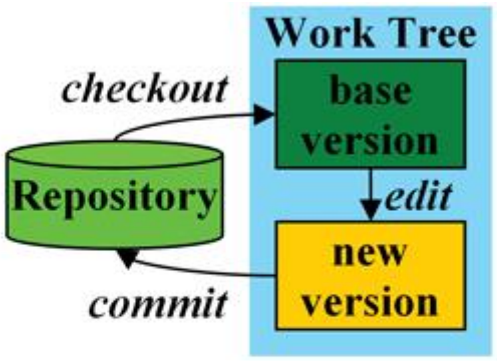

Add and Remove...
Add and Remove
Modify the resources that are configured on the server
Move resources to the right to configure them on the server
Available:
Configured:
curso.git
Add >
< Remove
Add All >>
<< Remove All
☑ If server is started, publish changes immediately
< Back
Next >
Finish
Cancel

Once is in the server right click on it and click first on publish and then in start/debug and you will see the project running in http://localhost:8080/struts/welcome.do

TECHNOLOGY INFORMATION

GIT/SVN/MERCURIAL

All of them are source control systems. Each one has its own approach for the same problem.



The difference between svn (Subversion) and git.
http://stackoverflow.com/questions/871/why-is-git-better-than-subversion

Git command line
https://git-scm.com/docs/gittutorial

SVN command line
https://tortoisesvn.net/docs/nightly/TortoiseSVN_en/tsvn-cli-main.html

JQUERY/ JQUERYUI

It is a javascript library/framework. It will help us to code our frontend.

¡IMPORTANT TO KNOW!

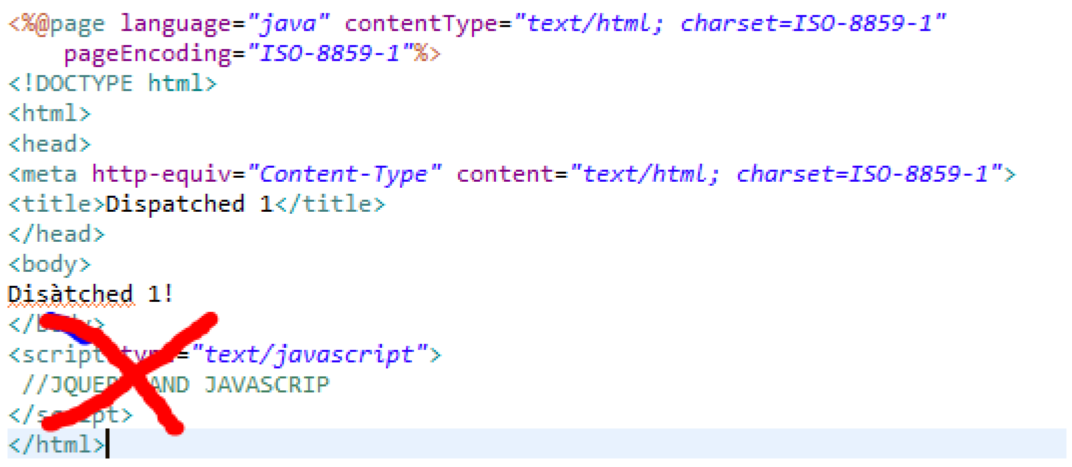
-Avoid problems by:

- loading first JQuery and then JQueryUI.

- Having only JQuery in the page.

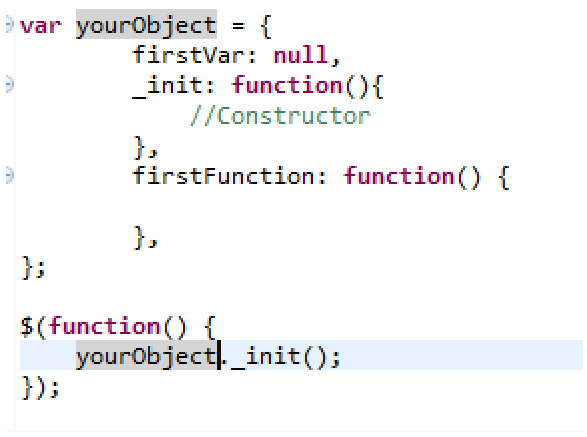
CODING PRACTICES

-As much as we can, do not code inline jquery and javascript. This practice makes page dirty and javascript code not debugable.



```
<%@page language="java" contentType="text/html; charset=ISO-8859-1"
    pageEncoding="ISO-8859-1"%>
<!DOCTYPE html>
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
<title>Dispatched 1</title>
</head>
<body>
Disàtched 1!
</body>
<script type="text/javascript">
 //JQUERY AND JAVASCRIP
</script>
</html>
```

-Construct your javascript objects like:



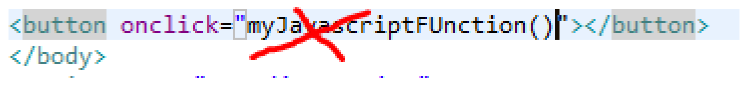
```
var yourObject = {
        firstVar: null,
        _init: function(){
            //Constructor
        },
        firstFunction: function() {

        },
};

$(function() {
    yourObject._init();
});
```

*As in javascript there is no limitation while accessing methods within an object. We can mark all private functions and variables in your object with an underscore prefix.

*The "_*init*" function is the constructor.

*Call the init function on document ready. In order to do a correct binding we need to know that the html has been loaded.

- Do not set javascript functions in the html. It makes code more difficult to maintain. The binding should be done in the javascript object within the init method.



```
<button onclick="myJavascriptFUnction()"></button>
</body>
```

URL for work: http://localhost:8080/struts/jquery.do

URL for JQuery info: https://jquery.com/

URL for JQuery UI demos (VERY HELPFUL): http://jqueryui.com/demos/ and http://www.w3schools.com/jquery/jquery_examples.asp

MAVEN

Maven will make life easy by helping us Building the project and importing dependencies.

pom.xml, is the file that will take care of the project. In here we will set up the project build and the dependencies that we need. The POM file is and XML file that contains information about the project such us dependencies, version, packaging, name, etc.

.m2, is the folder within our user that will have all the dependencies that we are requesting to the central repository.

settings.xml, is the file within the .m2 folder that will hold the configuration shared across all the projects.(example a plugin to compile projects that is used in several projects).

Central repository is the cloud from where we will fetch libraries.(Some companies have its own repositories)

Commands, useful commands to run from eclipse or command line:

mvn clean: Cleans the target folder which is the one holding compiled code.

mvn install: Will run test , compile and create the generated compiled zip (war, jar).

mvn package: Generates the compiled zip (war, jar).

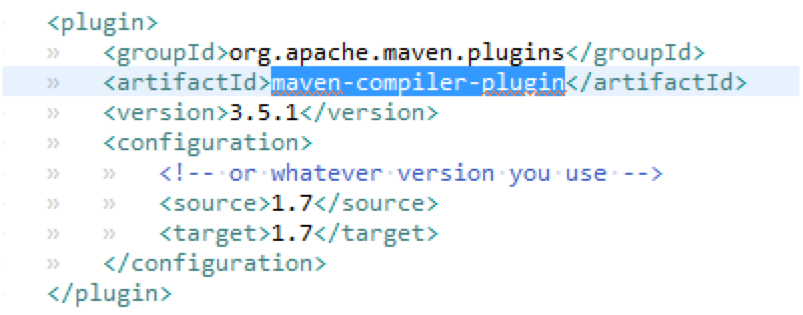
mvn test: Runs the project tests.

PLUGINS

Maven provides plugins in order to change and add some functionality and behaivor.

maven-compiler-plugin

This plugin help us while compiling our code.

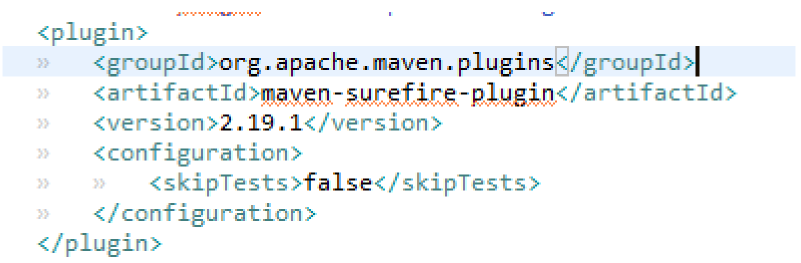


```
<plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-compiler-plugin</artifactId>
    <version>3.5.1</version>
    <configuration>
        <!-- or whatever version you use -->
        <source>1.7</source>
        <target>1.7</target>
    </configuration>
</plugin>
```

In here for example we are telling which java versions are we using for compiling the code.

maven-surefire-plugin

This plugin will help us while running tests.



```
<plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-surefire-plugin</artifactId>
    <version>2.19.1</version>
    <configuration>
        <skipTests>false</skipTests>
    </configuration>
</plugin>
```

For example, we are telling here that every time we do “mvn install” we want to run tests as well.

INFO

MAVEN URL: https://maven.apache.org/guides/getting-started/

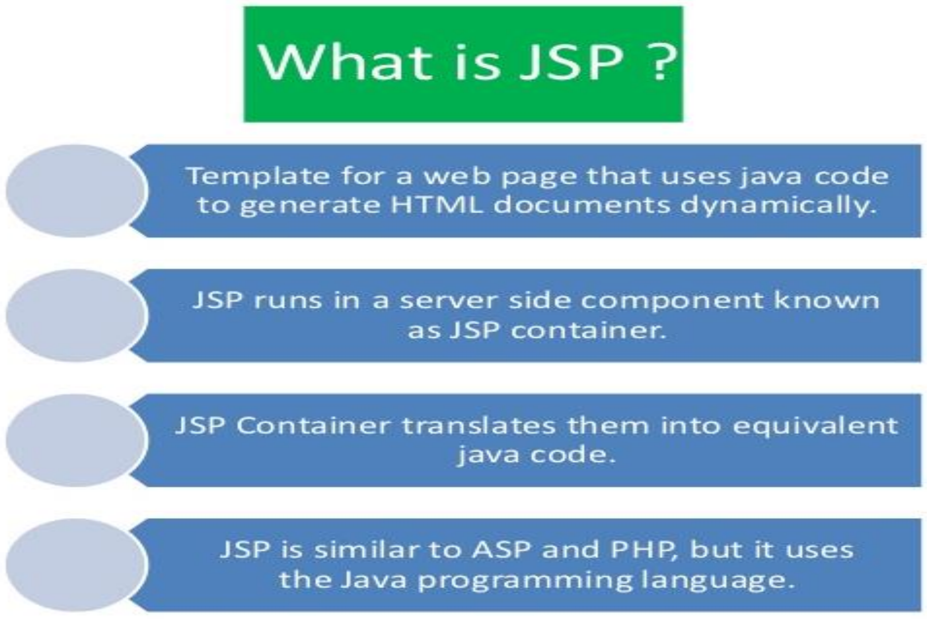
SUREFIRE PLUGIN: http://maven.apache.org/components/surefire/maven-surefire-plugin/

MAVEN COMPILER PLUGIN : https://maven.apache.org/plugins/maven-compiler-plugin/

JSP

While working with Java we might use JSPs. JSP is basically an HTML with special tags.

> -These tags are being run in the server before getting to the client through the network.
> -These tags are developed in java.



What is JSP ?

Template for a web page that uses java code to generate HTML documents dynamically.

JSP runs in a server side component known as JSP container.

JSP Container translates them into equivalent java code.

JSP is similar to ASP and PHP, but it uses the Java programming language.

The main tags we have available in a JSP are very well explained in the following page: http://www.tutorialspoint.com/jsp/jsp_standard_tag_library.htm

We will see that struts framework has its own tags as well.

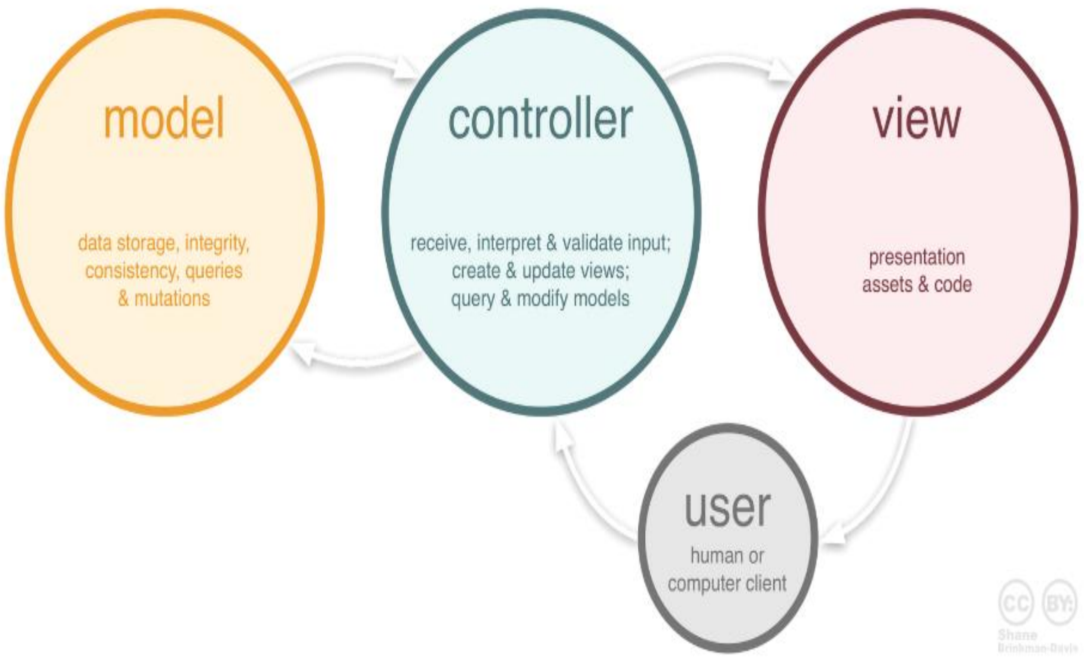
STRUTS

Struts is an open source framework. It is based in the Model, View, Controller (MVC) architecture. It enables you to create maintainable, extensible, and flexible web applications based on standard technologies, such as JSP pages, JavaBeans, resource bundles, and XML.

In order to add struts 1.3 to our project we have to add the following maven libraries:

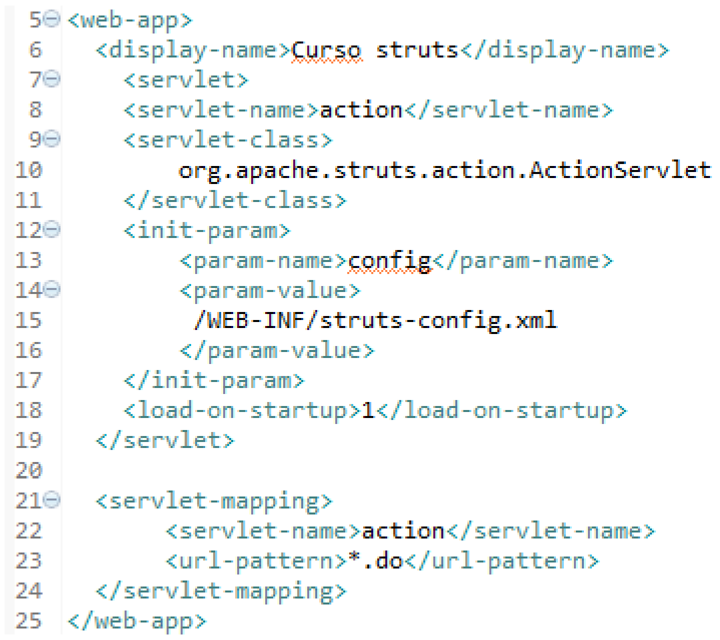
```
	<!-- Struts -->
	<dependency>
		<groupId>org.apache.struts</groupId>
		<artifactId>struts-core</artifactId>
		<version>1.3.10</version>
	</dependency>
	<dependency>
		<groupId>org.apache.struts</groupId>
		<artifactId>struts-extras</artifactId>
		<version>1.3.10</version>
	</dependency>
	<dependency>
		<groupId>org.apache.struts</groupId>
		<artifactId>struts-taglib</artifactId>
		<version>1.3.10</version>
	</dependency>
```

MVC


model
data storage, integrity, consistency, queries & mutations
controller
receive, interpret & validate input; create & update views; query & modify models
view
presentation assets & code
user
human or computer client
Shane Brinkman-Davis

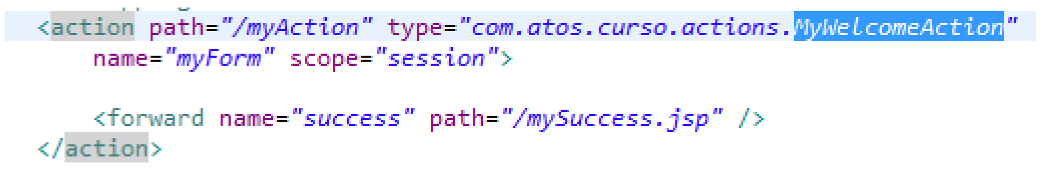
STRUTS PROJECT BASIC CONFIGURATION

In order to configure struts in a project we have to change the web.xml to route certain calls through struts servlet. In the following example all requests matching *.do will be routed through struts. So that, a call like "*/somecall.html*" will not go through struts and that can be a simple java servlet.



```
<web-app>
  <display-name>Curso struts</display-name>
    <servlet>
    <servlet-name>action</servlet-name>
    <servlet-class>
        org.apache.struts.action.ActionServlet
    </servlet-class>
    <init-param>
        <param-name>config</param-name>
        <param-value>
         /WEB-INF/struts-config.xml
        </param-value>
    </init-param>
    <load-on-startup>1</load-on-startup>
  </servlet>

  <servlet-mapping>
       <servlet-name>action</servlet-name>
       <url-pattern>*.do</url-pattern>
  </servlet-mapping>
</web-app>
```

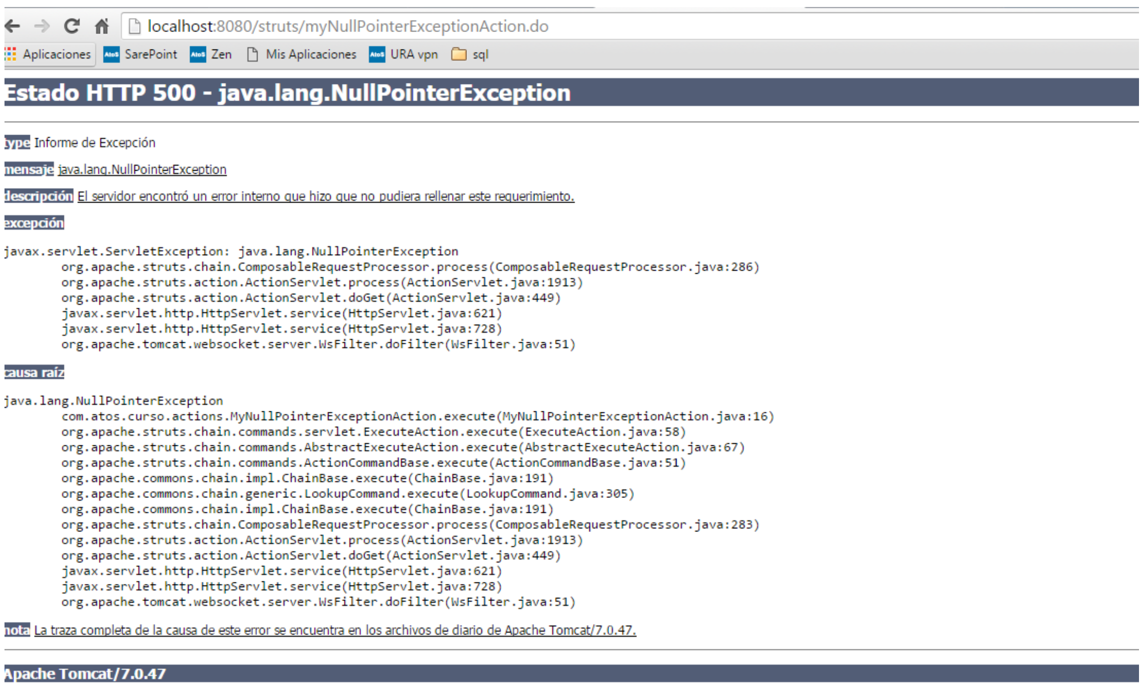
The file that takes care of struts configuration is usually called ***struts-config.xml***. In this file we basically tell the routing. For instance, the routing the image below will behave as: Any request "/myAction.do" will go through the java class "*MyWelcomeAction*" and then if success render the jsp *"mySuccess.jsp"* .



```
<action path="/myAction" type="com.atos.curso.actions.MyWelcomeAction"
    name="myForm" scope="session">

    <forward name="success" path="/mySuccess.jsp" />
</action>
```

GLOBAL EXCEPTIONS

Struts is able to redirect exceptions to specific error pages. So that we can avoid seeing screens like the following one:



Estado HTTP 500 - java.lang.NullPointerException

type Informe de Excepción

mensaje java.lang.NullPointerException

descripción El servidor encontró un error interno que hizo que no pudiera rellenar este requerimiento.

excepción

```
javax.servlet.ServletException: java.lang.NullPointerException
	org.apache.struts.chain.ComposableRequestProcessor.process(ComposableRequestProcessor.java:286)
	org.apache.struts.action.ActionServlet.process(ActionServlet.java:1913)
	org.apache.struts.action.ActionServlet.doGet(ActionServlet.java:449)
	javax.servlet.http.HttpServlet.service(HttpServlet.java:621)
	javax.servlet.http.HttpServlet.service(HttpServlet.java:728)
	org.apache.tomcat.websocket.server.WsFilter.doFilter(WsFilter.java:51)
```

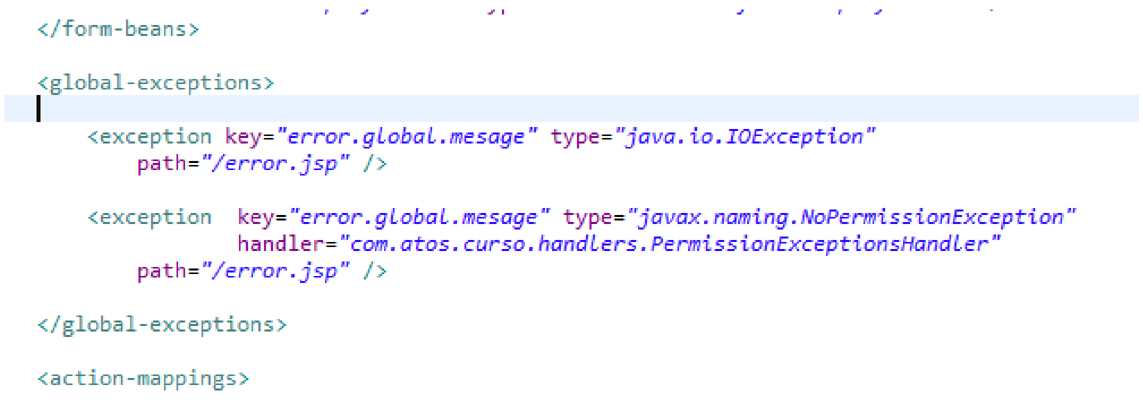
causa raíz

```
java.lang.NullPointerException
	com.atos.curso.actions.MyNullPointerExceptionAction.execute(MyNullPointerExceptionAction.java:16)
	org.apache.struts.chain.commands.servlet.ExecuteAction.execute(ExecuteAction.java:58)
	org.apache.struts.chain.commands.AbstractExecuteAction.execute(AbstractExecuteAction.java:67)
	org.apache.struts.chain.commands.ActionCommandBase.execute(ActionCommandBase.java:51)
	org.apache.commons.chain.impl.ChainBase.execute(ChainBase.java:191)
	org.apache.commons.chain.generic.LookupCommand.execute(LookupCommand.java:305)
	org.apache.commons.chain.impl.ChainBase.execute(ChainBase.java:191)
	org.apache.struts.chain.ComposableRequestProcessor.process(ComposableRequestProcessor.java:283)
	org.apache.struts.action.ActionServlet.process(ActionServlet.java:1913)
	org.apache.struts.action.ActionServlet.doGet(ActionServlet.java:449)
	javax.servlet.http.HttpServlet.service(HttpServlet.java:621)
	javax.servlet.http.HttpServlet.service(HttpServlet.java:728)
	org.apache.tomcat.websocket.server.WsFilter.doFilter(WsFilter.java:51)
```

nota La traza completa de la causa de este error se encuentra en los archivos de diario de Apache Tomcat/7.0.47.

Apache Tomcat/7.0.47

The exception configuration in struts might look like the following one:



```
</form-beans>

<global-exceptions>

    <exception key="error.global.mesage" type="java.io.IOException"
        path="/error.jsp" />

    <exception  key="error.global.mesage" type="javax.naming.NoPermissionException"
                handler="com.atos.curso.handlers.PermissionExceptionsHandler"
        path="/error.jsp" />

</global-exceptions>

<action-mappings>
```

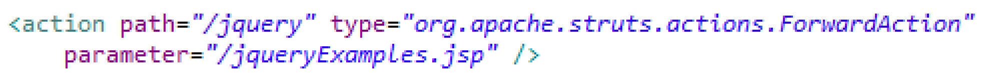
It should go between the forms and actions mappings configuration. This configuration will redirect any IOException happening in the project to the *error.jsp* page and any NoPermissionException through the handler and then render the *error.jsp* page. The handler might be useful if we want to do something extra when this exception happens.

ACTION MAPPINGS

The action mappings will tell the route of each request.

Simplest mapping

The simplest mapping configuration is when we do not need a controller. So, a URL maps to a page without any java code between. Used for static pages.



```
<action path="/jquery" type="org.apache.struts.actions.ForwardAction"
    parameter="/jqueryExamples.jsp" />
```

Mapping with an action

If we need a java action to take place between we should change the type attribute in the configuration:

```
<action path="/myAction" type="com.atos.curso.actions.MyWelcomeAction"
    name="myForm" scope="session">

    <forward name="success" path="/mySuccess.jsp" />
</action>
```

*In this example a URL ended with myAction.do will go through the execute method within *"MyWelcomeAction"* java class and the will render the page "*mySuccess.jsp*".

Render different pages

Imagine that we want to render a different page depending on some condition in the java Action method.

The struts-config.xml action can be something like:

```
<action path="/someAction" type="com.atos.curso.actions.SomeAction"
    name="employeeForm">

    <forward name="success" path="/mySuccessSave.jsp" />
    <forward name="anotherSuccess" path="/myAnotherSuccessSave.jsp" />
</action>
```

The Java Action method can tell which forward do we want.

```
public ActionForward execute(ActionMapping mapping, ActionForm form, HttpServletRequest request,
        HttpServletResponse response) throws Exception {

        if(someCondition){
            return mapping.findForward("anotherSuccess");
        }else {
            return mapping.findForward("success");
        }

}
```

Using forms with java validation

When we work with forms we have to tell that to struts. Imagine that we have a form in a page to save employees and the post save action is "*/saveEmployee.do*". We want to validate the form and we want to render a success page once the employee has been saved.

The strtuts-config.xml should have:

The form defined.

```
<form-beans>
    <form-bean name="employeeForm" type="com.atos.curso.forms.EmployeeForm" />
</form-beans>
```

The struts action mapping with the form reference name.

```
    <action path="/saveEmployee" type="com.atos.curso.actions.MySaveAction"
        name="employeeForm" validate="true" scope="request" input="/mySuccess.jsp">

        <forward name="success" path="/mySuccessSave.jsp" />
    </action>
```

***validate** attribute tells struts we want to validate the form before getting to the action.

***scope** can be request or session. We set that to request because the form must be available only in the very next request.

***input** If there are errors in the form struts will render again the input page.

The java form class is a normal POJO extending "*FormAction*" Struts internal class and overriding the validation and reset methods.

```
public class EmployeeForm extends ActionForm {

    private String name;
    private String surname;
    private String address;

    @Override
    public ActionErrors validate(ActionMapping mapping, HttpServletRequest request) {

        ActionErrors errors = new ActionErrors();

        if (getName() == null || ("".equals(getName()))) {
            errors.add("common.name.err", new ActionMessage("error.common.name.required"));
        }

        return errors;
    }

    @Override
    public void reset(ActionMapping mapping, HttpServletRequest request) {
        name = "";
        surname = "";
        address = "";
    }
```

The form should look like:

```
<html:form action="/saveEmployee.do">

    <div class="error" >
        <html:errors />
    </div>
    <html:text property="name" size="20" maxlength="20" />
    <html:text property="surname" size="20" maxlength="20" />
    <html:text property="address" size="20" maxlength="20" />

    <div style="padding: 16px">
        <div style="float: left; padding-right: 8px;">
            <html:submit>
                Save Employee
            </html:submit>
        </div>
        <html:reset>
            Reset form
        </html:reset>
    </div>
</html:form>
```

*The tag html is a specific struts tag.

Using forms with XML validation

Imagine that we want something like number 4 example but we want to use an xml file for validation instead of a java code. We can do that by using a struts validation plugin.

The strtuts-config.xml should have:

The form defined.

```
    <form-bean name="employeeXMLValidationForm"
        type="com.atos.curso.forms.EmployeeXMLValidationForm" />
</form-beans>
```

The action mapping which is the same as any other one.

```
<action path="/saveWithXMLValidation" type="com.atos.curso.actions.SaveWithXMLValidationAction"
    name="employeeXMLValidationForm" input="/xmlValidation.jsp">

    <forward name="success" path="/mySuccessSave.jsp" />

</action>
```

The plugin configuration at the very end of the struts-config.xml file, just before closing struts-config xml tag.

```
<plug-in className="org.apache.struts.validator.ValidatorPlugIn">
    <set-property property="pathnames"
        value="/WEB-INF/validator-rules.xml, /WEB-INF/validator-employee.xml" />

</plug-in>
```

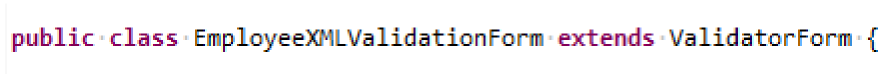
In here we have to tell struts which are the:

- Validation rules files. This file contains some general rules to be used when validating. We can create our own rules as well.

-Our validator xml files which will have specific rules for specific forms.

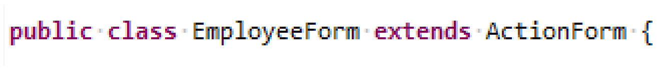
The java form class is a normal POJO extending "*ValidatorForm*" Struts internal class instead of "*FormAction*" which is used in normal forms.

With XML Validation



```java
public class EmployeeXMLValidationForm extends ValidatorForm {
```

Without XML validation



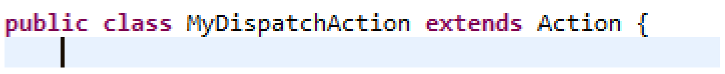
```java
public class EmployeeForm extends ActionForm {
```

Regarding to the html form should look like the one in example 4.

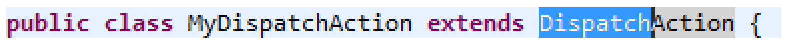
Multiple actions

Multiple actions within the same java class. Holding multiple actions in the same java class is easy. I have to change the struts internal class that we extend in normal Action controllers.

While coding your controller, instead of using *Action* use *DispatchAction*.

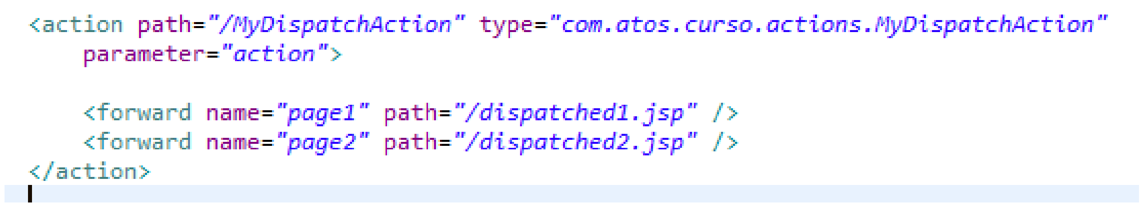


```java
public class MyDispatchAction extends Action {
```



```java
public class MyDispatchAction extends DispatchAction {
```

Your struts-config.xml file action mapping should be something like:



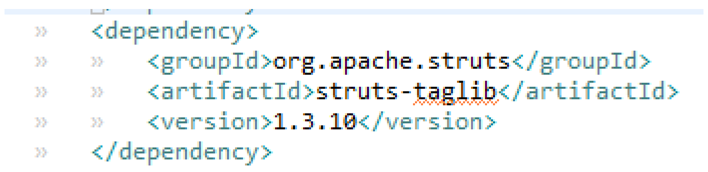
```xml
<action path="/MyDispatchAction" type="com.atos.curso.actions.MyDispatchAction"
    parameter="action">

    <forward name="page1" path="/dispatched1.jsp" />
    <forward name="page2" path="/dispatched2.jsp" />
</action>
```

The parameter attribute is the name of the query parameter in the URL specifying the action. For example, "/struts/MyDispatchAction.do?action=page2*".

STRUTS JSP TAGS

Struts has special html tags in order to help us developing. All tags generate html code, they run in the server, not in the client!!.

The java library that holds these classes can be downloaded from MAVEN repository:

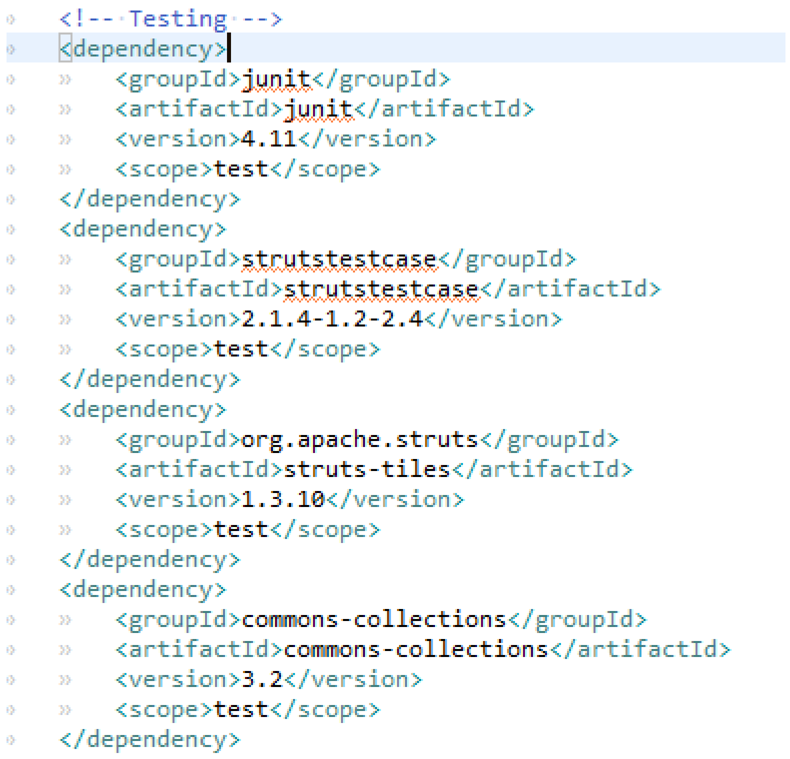


```
    <dependency>
        <groupId>org.apache.struts</groupId>
        <artifactId>struts-taglib</artifactId>
        <version>1.3.10</version>
    </dependency>
```

URL http://tutorials4u.net/struts-tutorial/struts_logic_tag_example.html

STRUTS INTEGRATION TESTING

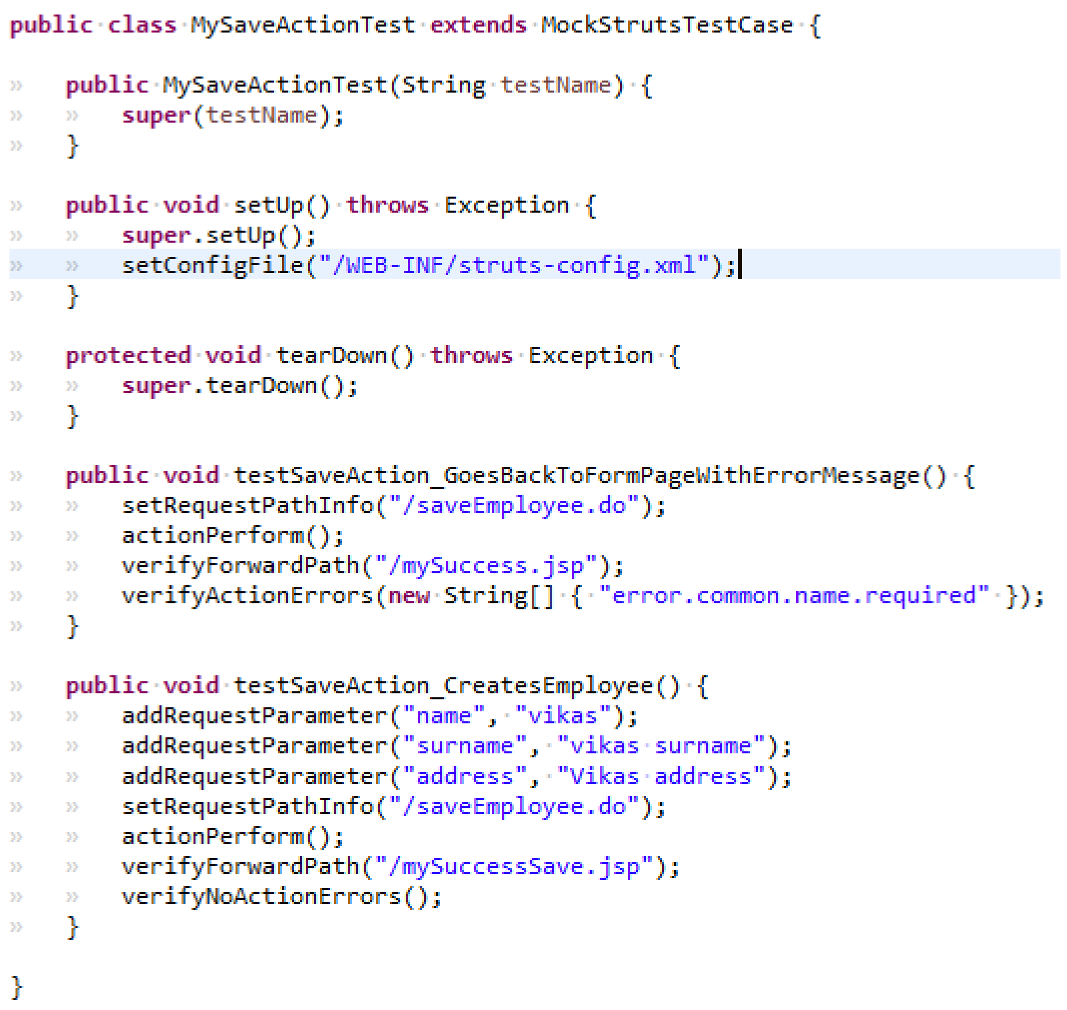
In order to be able develop out integration tests in Struts we should, at least, add the following maven libraries:



```
    <!-- Testing -->
    <dependency>
        <groupId>junit</groupId>
        <artifactId>junit</artifactId>
        <version>4.11</version>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>strutstestcase</groupId>
        <artifactId>strutstestcase</artifactId>
        <version>2.1.4-1.2-2.4</version>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.apache.struts</groupId>
        <artifactId>struts-tiles</artifactId>
        <version>1.3.10</version>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>commons-collections</groupId>
        <artifactId>commons-collections</artifactId>
        <version>3.2</version>
        <scope>test</scope>
    </dependency>
```

- Note the scope. Setting the scope to test means that these libraries are only available when testing.

The following class is an example of an integration test:



```java
public class MySaveActionTest extends MockStrutsTestCase {

    public MySaveActionTest(String testName) {
        super(testName);
    }

    public void setUp() throws Exception {
        super.setUp();
        setConfigFile("/WEB-INF/struts-config.xml");
    }

    protected void tearDown() throws Exception {
        super.tearDown();
    }

    public void testSaveAction_GoesBackToFormPageWithErrorMessage() {
        setRequestPathInfo("/saveEmployee.do");
        actionPerform();
        verifyForwardPath("/mySuccess.jsp");
        verifyActionErrors(new String[] { "error.common.name.required" });
    }

    public void testSaveAction_CreatesEmployee() {
        addRequestParameter("name", "vikas");
        addRequestParameter("surname", "vikas surname");
        addRequestParameter("address", "Vikas address");
        setRequestPathInfo("/saveEmployee.do");
        actionPerform();
        verifyForwardPath("/mySuccessSave.jsp");
        verifyNoActionErrors();
    }

}
```

- All our **Struts integration tests** must extend the *MockStrutsTestCase* java class.
- In the **setup method** we should specify some global configuration for struts or some initialization that needs to be run before testing.
    - The method **setConfigFile** specifies the path to the struts configuration file. Notice that the route in this test is the default one, so that, we could just delete the line and the test would run anyway.
- The test …*_**GoesBackToFormPageWithErrorMessage*** test the action when no form has been set.
- The test …*_**CreatesEmployee*** test the action with a form added to the request.

However, this test has a big problem!!. It is not encapsulated. It depends on an existing DDBB connection. For building an encapsulated integrated test we should be mocking the *TtConnection* class. Sadly this class is a singleton…
http://stackoverflow.com/questions/2302179/mocking-a-singleton-class

INFO

In the following page you will find some useful struts examples:

http://www.mkyong.com/struts/struts-hello-world-example/